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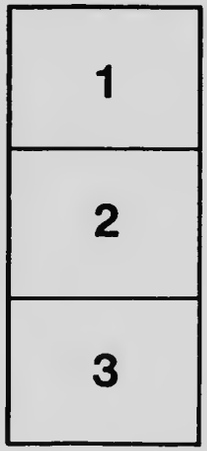


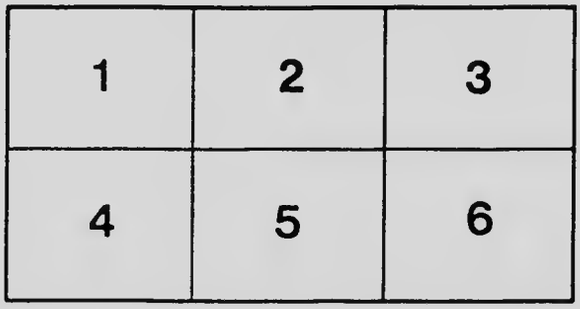

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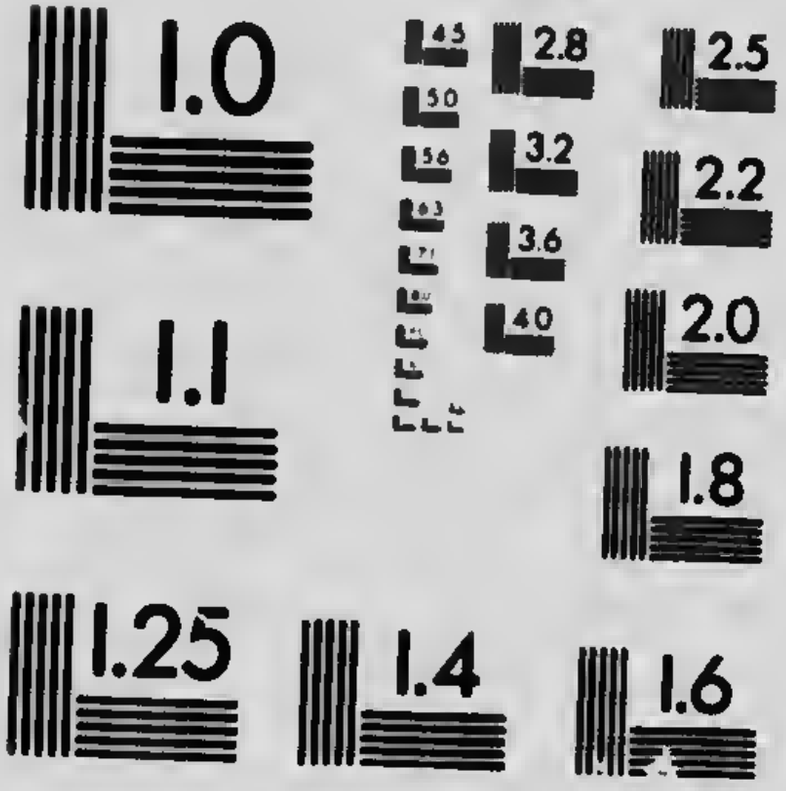


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DOMINION OF CANADA.

EXPERIMENTAL FARM FOR SOUTHERN SASKATCHEWAN.

WM. SAUNDERS, C.M.G., Director.

ANGUS MACKAY, Superintendent.

# PREPARING LAND FOR GRAIN-CROPS IN SASKATCHEWAN.

BY ANGUS MACKAY,

Superintendent of Experimental Farm, Indian Head, Sask.

During the growing season of 1908 almost the entire western portion of the province suffered from dry weather, and the majority of the new settlers, either from unfamiliarity with the methods of cultivation for the conservation of moisture, or through a desire to bring the greatest possible area under cultivation, naturally suffered a severe disappointment.

In some districts, where in former years moisture had been abundant and proper cultivation had in consequence been neglected in the effort to 'get rich quick,' the partial failure of the crop proved an expensive lesson.

For many years, commencing in 1888, the methods of conserving moisture by 'Breaking and Backsetting' and by 'Summer-fallowing,' now called 'Dry-farming' for a change, have been recommended and universally adopted by the older settlers, but to very many of the new settlers they are unknown. The latter, I trust, may be benefitted by the following explanation of the methods, which, for a great many years, have proven uniformly successful at the Experimental Farm here, and may with confidence be recommended for every district in the province of Saskatchewan.

## BREAKING PRAIRIE SOD.

The success or failure of a new settler often depends on the method employed in the preparation of the land for his first crop, and it is therefore of the utmost importance that the question of 'Breaking' or 'Breaking and Backsetting' be given the consideration it deserves.

For some years past the general practice throughout the country has been to continue breaking three or more inches deep so long as the teams can turn over the sod, then in the fall to disc the top-soil and grow grain in the spring following. From the breaking so done before the end of June, a good crop of Wheat, Oats or Barley is usually obtained but no amount of cultivation will ensure even a fair crop on this land in the next succeeding year. After the first crop has been cut the soil is usually in a perfectly dry state and remains so, in spite of any known method of cultivation, until the rains come in the spring following. If they are insufficient or late, as is frequently the case, failure of the crop must be the result.

## BREAKING AND BACKSETTING.

Breaking and backsetting is the true way of laying the foundation for future success in the greater number of districts throughout the province, and while this

method does not permit of as large an acreage being brought under cultivation in the year, it does permit of more thorough work and ensures better results in the long run. The anxiety of nearly all settlers to sow every acre possible, regardless of how or when the work on the land has been accomplished, may be given as the reason for breaking and discing, to a large extent, superseding the older, better and safer plan.

Breaking and backsetting means the ploughing of the prairie sod as shallow as possible before the June or early July rains are over, and in August or September, when the sod will have become thoroughly rotted by the rains and hot sun, ploughing two or three inches deeper in the same direction and then harrowing to make a fine and firm seedbed. From land prepared in this way two good crops of wheat may be expected. The first crop will be heavy and the stubble, if cut high at harvest time, will retain sufficient snow to produce the moisture required, even in the driest spring to germinate the seed for the next crop. The stubble-land can readily be burned on a day in the spring with a warm, steady wind and the seed may be sown with or without further cultivation. In a case where the grass roots have not been entirely killed by the backsetting, a shallow cultivation before seeding will be found advantageous but as a rule the harrowing of the land with a drag-harrow after seeding will be sufficient.

The principal objection to 'breaking and backsetting is urged with regard to the backsetting which, no doubt, is heavy work for the teams, but if the discing required to reduce deep-breaking and then the ploughing or other cultivation that must be done in an effort to obtain a second crop, be taken into consideration it must be conceded that in the end 'breaking and backsetting' is the cheaper and better method.

When two crops have been taken from new land it should be summer-fallowed.

## SUMMER-FALLOWS AND SUMMER-FALLOWING.

Among the many advantages to the credit of the practice of summer-fallowing may be mentioned:—The conservation of moisture, the eradication of weeds, the preparation of the land for grain-crops at a time when no other work is pressing, the availability of summer-fallowed land for seeding at the earliest possible date in the spring and the minor advantages of having suitable land for the growing of pure seed, potatoes, roots and vegetables at the least cost and with the greatest chance for success, and that of being able to secure two crops of grain with little or no further cultivation.

Summer-fallowing undoubtedly has some disadvantages, but so long as the growing of grain, and more particularly wheat, remains the principal industry of the province, it will be necessary to store up moisture against a possible dry season, to restrain the weeds from over-running the land and on account of the short seasons, to prepare at least a portion of the land to be cropped in the year previous to seeding and a well made summer-fallow is the best means to this end. Among the disadvantages are:—The liability of the soil to drift, the over-production of straw in a wet season, causing late maturity and consequent danger of damage by frost, and it is claimed, the partial exhaustion of the soil. The two former may, to a great extent, be overcome by different methods of cultivation, and if the soil can be prevented from drifting, I am satisfied that one of the reasons for the latter contention will disappear.

Various methods are practised in the preparation of fallow and where the aim has been to take advantage of the June and July rains and to prevent the growth of weeds, success is almost assured. Where the object has been to spend as little time as possible on the work, failure is equally certain.

In my annual report for the year 1889, the following was submitted for the consideration of the settlers. Since then many experiments have been conducted on the Experimental Farm with different systems and again I submit what, on the whole, have been found to be the most successful methods for the cultivation of the soil in Saskatchewan:—

## FROM REPORT OF 1889.

December 29.

'The year just past has been one of extremes. Last winter was one of the mildest on record and March was so very fine that thousands of acres of grain were seeded from the 15th to the 31st, and at no time in the history of the country has the ground been in better condition for the reception of the seed. Immediately after seeding, however, exceptionally high winds set in, followed by extreme drought during the entire growing season. In many places the crops were injured by the winds and finally almost ruined by the succeeding dry weather. In some localities, however, where the farming has been done in accordance with the requirements of the country, the crops did fairly, and considering the excessively dry weather, remarkably well.

'The Experimental Farm suffered in company with every other farm in the country. Perhaps very few suffered as much from winds, but the dry weather, though reducing the yields, did not prove so disastrous as to many others. In this portion of the Territories at least, every settler knows the importance of properly preparing his land. For several years after the country became open for settlement every one imagined that grain would grow, no matter how put in, but now the man is devoid of reason who thinks he is sure of a crop without any exertion on his part. It is true that since 1882 we have had one year in which the land required little or no preparation for the production of an abundant crop but only too many realize the loss in the remaining years from poor cultivation.

'Our seasons point to only one method of cultivation by which we may in all years expect to reap something.

'It is quite within the bounds of possibilities that some other and perhaps more successful method may be found, but at present I submit that 'fallowing' the land is the best preparation to ensure a crop. Fallowing land in this country is not required for the purpose of renovating it, as is the case with the worn-out lands in the East; and it is a question as yet unsettled how much or how little the fallows should be worked but as we have only one wet season during the year, it has been proved beyond doubt that the land must be ploughed the first time before this wet season is over, if we expect to reap a crop in the following year. The wet season comes during June and July, at a time when every farmer has little or nothing else to do, and it is t[illegible] this work should be done. Usually seeding is over by the 1st of May and to [illegible]est results the land for fallow should be ploughed from 5 to 7 inches de[illegible] after this date as possible. Land ploughed after July is of no use wh[illegible]s the rains in August are much in excess of the average. A good har[illegible] should succeed the ploughing and all weeds or volunteer grain be kept down by successive cultivation. A good deal of uncertainty is felt with regard to a second ploughing, some holding that it is useless; others maintaining that it is an injury; while others again have found it to give from five to ten bushels per acre more than one ploughing. So far the experiments on the Experimental Farm have shown that by far the best returns have been received from two ploughings; and more noticeably was this the case when the first ploughing had been completed in May or June. Without doubt, two ploughings cause a greater growth of straw and consequently in a wet year the grain is several days later in maturing, causing greater danger from frost; but taking the seasons so far passed, 1881 excepted, two ploughings with as much surface cultivation as possible in between, may be safely recommended.

'Above all it is of the greatest importance that the first ploughing be as deep as possible, and that it be done in time to receive the June and July rains.'

After seventeen years further experience and observation the following was written on this subject in the Annual Report of the Experimental Farms for 1906.

## FROM REPORT OF 1906.

### Methods of Preparing Soil for Grain Crops.

#### METHODS OF PREPARING NEW GROUND.

'In view of the fact that every year brings to the Northwest many new settlers who are unacquainted with the methods of breaking up and preparing new land for crop, a few suggestions with regard to this important work may not be amiss.

'In all sections where the sod is thick and tough, breaking and backsetting should be done; while in the districts where bluffs abound and the sod is thin, deep breaking is all that is necessary.

'The former is generally applicable to the southern and western portions, and the latter to the northeastern part of Saskatchewan, where the land is more or less covered with bluffs.

#### BREAKING AND BACKSETTING.

'The sod should be turned over as thin as possible, and for this purpose a walking plough with a 12 or 14-inch share, is the best. When the breaking is completed (which should not be later than the second week in July), rolling will hasten the rotting process and permit backsetting to commence early in August.

'Backsetting is merely turning the sod back to its original place, and at the same time bringing up two or three inches of fresh soil to cover it. The ploughing should be done in the same direction as the breaking and the same width of furrow turned. Two inches below the breaking is considered deep enough but three to four inches will give better results.

'After backsetting, the soil cannot be made too fine, and the use of disc or Randall harrow to cut up every piece of unrotted sod, will complete the work.'

#### DEEP BREAKING.

'Deep breaking, which in some sections of the country is the only practicable way of preparing new land, and which is, unfortunately, done in some instances where breaking and backsetting would give much more satisfactory results, consists in the turning over of the sod as deeply as possible, usually from four to five inches. When the sod has rotted, the top soil should be worked and made as fine as possible. The use of harrow or disc will fill up all irregularities on the surface, and make a fine, even seed-bed.

'Whether the land is broken shallow or deep, it is necessary to have the work completed early, so as to take advantage of the rains which usually come in June or early in July. These rains cause the sod to rot, and without them, or if the ploughing is done after they are over, the sod remains in the same condition as when turned, and no amount of work will make up for the loss.'

#### SUMMER FALLOWS.

'The true worth of properly prepared fallows has been clearly demonstrated in past years in every district of Saskatchewan.

'The work of preparing land for crop by fallowing is carried on in so many ways in different parts of the country, that perhaps a few words on some of the methods employed may be of use to at least some of the new settlers.

'It has been observed in some parts of Saskatchewan that the land to be fallowed is not, as a rule, touched until the weeds are full grown and in many cases, bearing fully matured seed. It is then ploughed.

'By this method, which, no doubt, saves work at the time, the very object of a summer-fallow is defeated. In the first place, moisture is not conserved because the land has been pumped dry by the heavy growth of weeds; and, secondly, instead of

using the summer-fallow as a means of eradicating weeds, a foundation is laid for years of labour and expense by the myriads of foul seeds turned under.

'The endless fields of yellow-flowered weeds, generally Ball Mustard (*Neslia paniculata*), testify to the indifferent work done in many districts, and, while no weed is more easily eradicated by a good system of fallows, there is no weed that is more easily propagated or takes greater advantage of poor work on fallows or of fall or spring cultivation.

'As has been pointed out in my previous reports, early and thorough work on fallows is absolutely necessary to success, and I here repeat the methods and results of tests carried on for some years past.

'*First Method.*—Ploughed deep (6 to 8 inches) before last of June; surface cultivated during the growing season, and just before or immediately after harvest ploughed 5 or 6 inches deep.

'Result—Too much late growth if season was at all wet; grain late in ripening, and a large crop of weeds if the grain was in any way injured by winds.

'*Second Method.*—Ploughed shallow (3 inches deep) before the last of June; surface cultivated during the growing season, and ploughed shallow (3 to 4 inches deep) in the autumn.

'Result.—Poor crop in a dry year; medium crop in a wet year. Not sufficiently stirred to enable soil to retain the moisture.

'*Third Method.*—Ploughed shallow (3 inches) before the last of June; surface cultivated during the growing season, and ploughed deep (7 to 8 inches) in the autumn.

'Result.—Soil too loose and does not retain moisture. Crop light and weedy in a dry year.

'*Fourth Method.*—Ploughed deep (7 to 8 inches) before the last of June; surface cultivated during the growing season.

'Result.—Sufficient moisture conserved for a dry year, and not too much for a wet one. Few or no weeds, as all the seeds near the surface have germinated and been killed. Surface soil apt to blow more readily than when either of the other methods is followed. For the past fourteen years, the best, safest and cleanest grain has been grown on fallow worked in this way, and the method is therefore recommended.

'Fallows that have been ploughed for the first time after the first of July, and especially after July 15 have never given good results; and the plan too frequently followed of waiting till weeds are full grown, and often ripe, and ploughing-under with the idea of enriching the soil, is a method that cannot be too earnestly advised against.

'In the first place, after the rains are over in June or early in July, as they usually are, no amount of work, whether deep or shallow ploughing, or surface cultivation, can put moisture in the soil. The rain must fall on the first ploughing and be conserved by surface cultivation.

'Weeds, when allowed to attain their full growth, take from the soil all the moisture put there by the June rains, and ploughing-under weeds with their seeds ripe or nearly so, is adding a thousand fold to the myriads already in the soil, and does not materially enrich the land.'

During the past two years the term 'dry farming' has been applied to what was formerly known in the West as 'summer-fallowing.'

With the exception of the addition of the use of a soil-packer there is no change in the methods formerly employed, when the spring rains and frequent cultivation were depended upon for the packing of the soil.

Packers are, without doubt, most useful implements on the farm and where from any cause, the soil is loose, they should be used. They are, however, expensive im-

plements and within the means of comparatively few of the new settlers. Fortunately, early ploughing and frequent shallow cultivation may be depended upon to produce almost equally satisfactory results in the majority of cases.

### CULTIVATION OF STUBBLE.

When farmers summer-fallow one-third of their cultivated land each year, as they should, one-half of each year's crop will be on stubble. For wheat, the best preparation of this land is to burn the stuble on the first warm, windy day in the spring, and either cultivate shallow before seeding or give one or two strokes of the harrow after seeding, the object being to form a mulch to conserve whatever moisture may be in the soil, until the commencement of the June rains.

The portion intended for oats or barley, should be ploughed four or five inches deep and harrowed immediately; then seeded and harrowed as fine as possible. In case time will not permit of ploughing, good returns may be expected from sowing the seed oats or barley on the burnt ground, and disking it in; then harrowing well.

### FALL PLOUGHING.

With regard to fall ploughing it may be said that, as a rule, on account of short seasons and dry soil, very little work can possibly be done in the fall, but if the stubble-land is in a condition to plough and the stubble is not too long, that portion intended for oats and barley may then be ploughed, if time permits.

It is, however, a mistake to turn over soil in a lumpy or dry condition, as nine times out of ten it will remain in the same state until May or June, with insufficient moisture to properly germinate the seed, and the crop will very likely be overtaken by frost.

As to the quantity of seed to grow and the depth of sowing, long experience has shown that the best results are had in Saskatchewan by the sowing of one and a half bushels of wheat per acre or two bushels of barley or oats. Sowing about two inches deep has given the most satisfactory returns, and the seed should be got in as early as is practicable.